

## Other Nitrate Treatment Technologies

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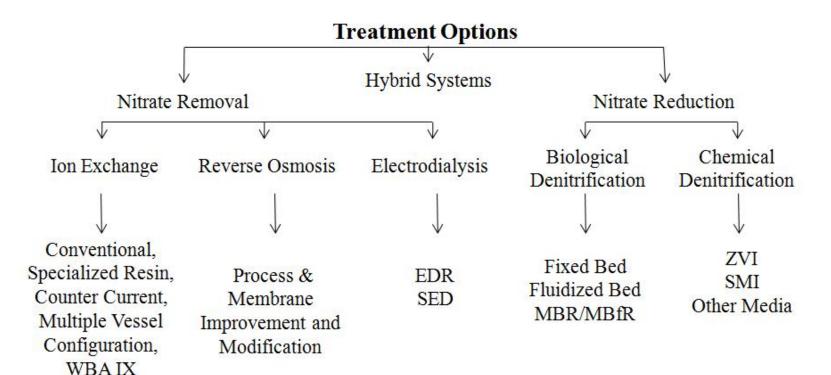


# **Summary of Nitrate Management Options**

## Non-Treatment Options ↓ ↓ ↓ ↓ Well Abandonment Wellhead Protection and Alternative Sources and Blending

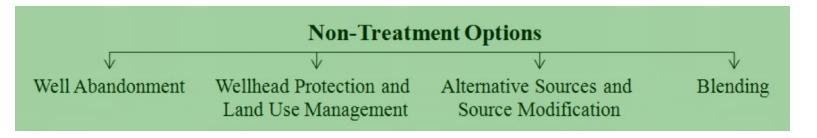
Source Modification

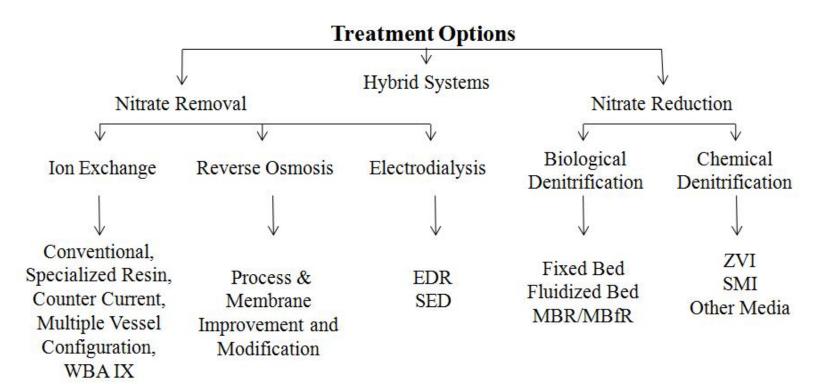
Land Use Management





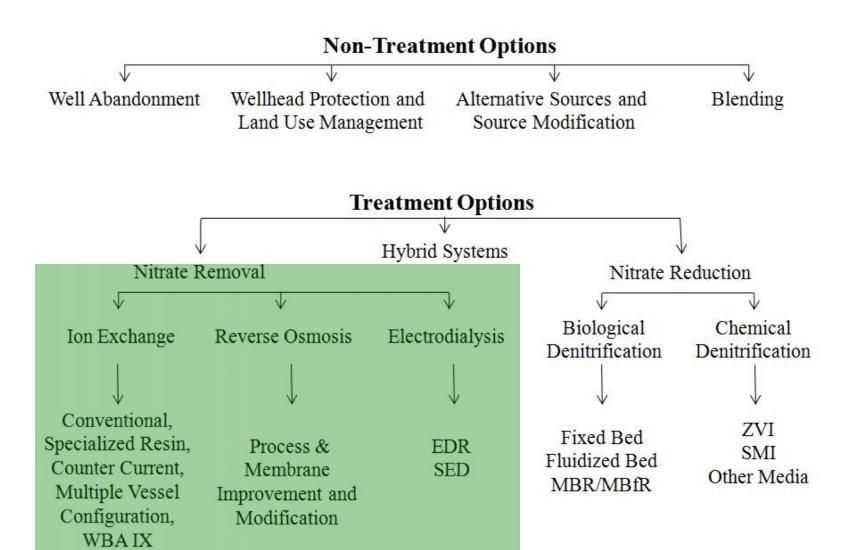
### **Non-Treatment Options**







### **Treatment Options: Nitrate Removal**





Conventional,

Specialized Resin,

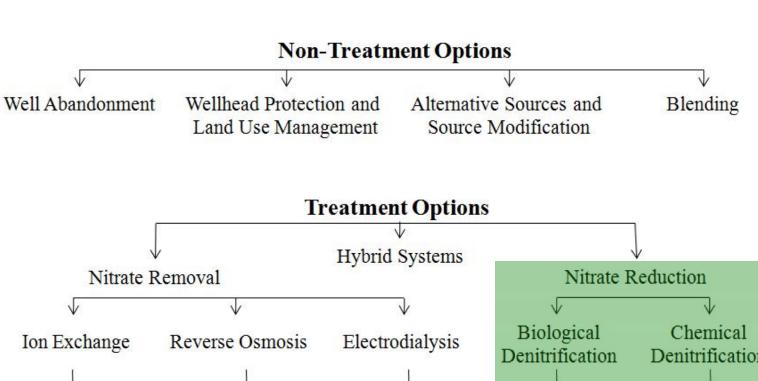
Counter Current,

Multiple Vessel

Configuration,

WBAIX

#### **Treatment Options: Nitrate Reduction**



Process & EDR
Membrane SED
Improvement and
Modification

Nitrate Reduction

W
Biological Chemical
Denitrification

Denitrification

Fixed Bed
Fluidized Bed
MBR/MBfR

Nitrate Reduction

Chemical
Denitrification

W
ZVI
SMI
Other Media

## Using: Catalytic Reduction Technology



$$(NO_3) + H_2 \xrightarrow{PdCu/ACC} NO_2^- + H_2O$$

$$NO_2^- + H_2 \xrightarrow{Pd/ACC} N_2 + 2OH^-$$

#### Our Innovation:

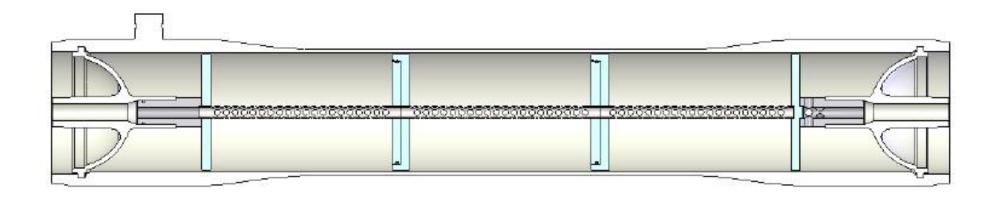
The Use of Activated Carbon Cloth as the Catalyst Support.

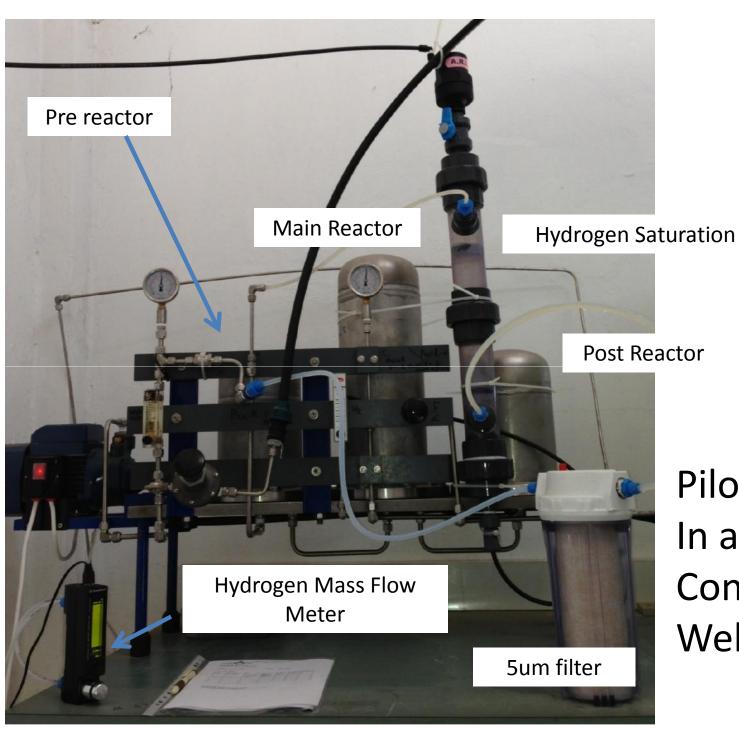






A Standard RO Pressure Vessel is Used as the Reactor. The Catalyst Modules Fit in the Vessel like RO Membranes.







Pilot System
In a
Contaminated
Well In Israel



Conventional,

Specialized Resin,

Counter Current,

Multiple Vessel

Configuration,

WBAIX

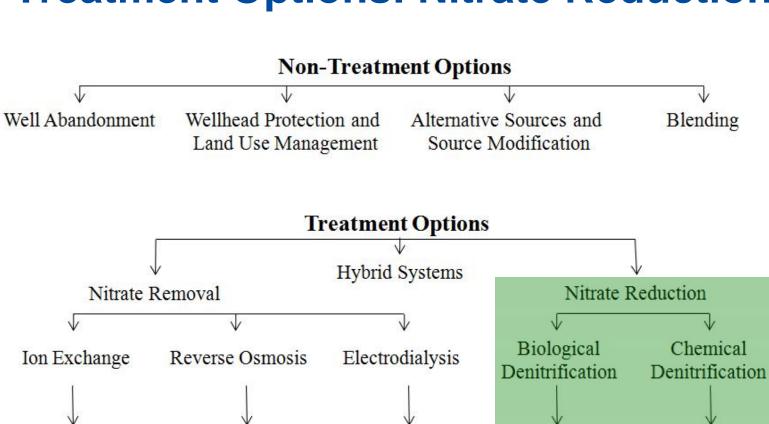
Process &

Membrane

Improvement and

Modification

#### **Treatment Options: Nitrate Reduction**



EDR

SED

ZVI

SMI

Other Media

Fixed Bed

Fluidized Bed

MBR/MBfR



### **Photocatalytic Reduction**

 Doudrick, K.; Monzón, O.; Mangonon, A.; Hristovski, K.; Westerhoff, P. K., Nitrate Reduction in Water Using Commercial Titanium Dioxide Photocatalysts (P25, P90, and Hombikat UV100). ASCE J. of Environ. Eng., 138(8), 852–861, 2012.



# **Summary of Nitrate Management Options**

